COURSE TITLE: Foundations of Energy

UNIT TITLE: Nonrenewable--Propane

SECTION 1: General Information and Overview

Grade Level: 9-12

Suggested Number of Lessons: 5-6

Suggested Time to Complete Unit: 1 week

Unit Overview: The unit will focus on research and discuss the production, processing, storage, transportation and uses of propane.

SECTION 2: Essential Questions

1.	Why is propane such an environmentally friendly fossil fuel and an important source of energy?
2.	What role does propane have as an energy source for residential and commercial purposes?
3.	How is propane used for a transportation fuel and how does storage and infrastructure impact its usage?

SECTION 3: Major Focus

Technical Content CTE Program of Studies	Learner Activities (Enabling Knowledge and Skills/Processes)	Core Content For Assessment	Academic Expectations
Construction Technology KOSSA Standard AD-002: Demonstrate the ability to learn new processes and steps. **2.1**--Assess the impact of various current and new technologies on the economy.	Using the Resource CD and the PDF files in the *Propane unit*, **listen** to teacher presentation on natural gas and **identify** byproduct such as propane. Using the online history channel videos, **identify** any other byproducts of natural gas. Students will research current and new policies in the energy industry for understandings of current energy trends and the	**SC-HS-1.16** Students will: • identify variables that affect reaction rates; • predict effects of changes in variables (concentration, temperature, properties of reactants, surface area and catalysts) based on evidence/data from chemical reactions. Rates of chemical reactions vary. Reaction rates depend on concentration, temperature and properties of reactants. Catalysts speed up chemical reactions. **DOK 3**	**2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.

6.2--Map the major sources of energy used in Kentucky.	impact on our nation's energy portfolio and economy on the state and national level. **View** map of the state to view locations and counties of major natural gas-producing areas. **Participate** in a class discussion on the geological differences of these locations, **summarize** the findings and **make** a graph or chart of results and **present** to class.		
Construction Technology KOSSA Standard AD-003: Implement new processes given oral instructions. **2.1-2.3--**Engaging in meaningful hands-on, minds-on conceptual based activities in the area of energy technologies.	Using the resource files on the CD, **develop** a oral presentation using charts and graphs or power points on the new or emerging technologies researched regarding propane energy, its chemical properties and use in the production of electricity. ***Note to teacher: This presentation will be assessed in the activity Energy source expo.***	**SC-HS-1.18** Students will: • explain the importance of chemical reactions in a real-world context; • Justify conclusions using evidence/data from chemical reactions. Chemical reactions (e.g., acids and bases, oxidation, combustion of fuels, rusting, tarnishing) occur all around us and in every cell in our bodies. These reactions may release or absorb energy. **DOK 3**	**2.2** Students identify, analyze and use patterns such as cycles and trends to understand past and present events and predict possible future events.
Construction Technology KOSSA Standard EA-005: Display initiative.	**Participate** in the activity E*nergy Enigma and Energy Source Expo;* **compare and contrast** uses and impacts of propane energy with other sources of energy around the US.	**SC-HS-4.61** Students will: • explain the relationships and connections between matter, energy, living systems and the physical environment; • give examples of conservation of matter and energy. As matter and energy flow through different organizational levels (e.g., cells, organs, organisms, communities) and	**2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

	Identify and **define** the following key terms: • peak load • base Load • IGCC • CGC • CFM • enigma **Record** this information in class notebook and **write** a summary report of your opinion on propane use in Kentucky.	between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change. **DOK 3**	

SECTION 4: Culminating Project with Scoring Guide

Students working in pairs will create and present an expo board on using "Propane as an energy source." Use this demonstration board to explain the production, storage, transportation, uses, and environmental issues involved with propane as an energy source. Include maps of the state and where propane production exists.

SCORING GUIDE:

CATEGORY	4	3	2	1
CONTENT	EXTENSIVE- CONTENT BEYOND WHAT IS TAUGHT IN CLASS	GOOD- EXPLANANTION OF CONCEPTS COVERED IN CLASS	BASIC – WHAT HAS ALREADY BEEN COVERED IN CLASS	LIMITED- DOESN'T COVER MATERIAL AS WELL AS DONE IN CLASS
PRESENTATION	EXCELLENT- FLOWS WELL, AUDIENCE VERY ATTENTIVE- WELL REHEARSED	GOOD – FLOWS WELL PARTICIPANTS KNOW MATERIAL WELL	BASIC – FLOWS UNEVENLY MAY HAVE SOME READING OF NOTES	LIMITED- PARTICIPANTS READ FROM NOTES
INTEREST	EXTENSIVE – PARTICIPANTS MAKE MANY EXTENSIONS AND EXPLANATIONS	APPROPRIATE – ENCOURAGES QUESTIONS AND COMMENTS	BASIC – CAN FIELD SOME QUESTIONS	LIMITED – GLAD TO BE THROUGH WITH THE PRESENTATION

SECTION 5: Assessment and Enabling Skills and Processes

Assessment:	Present a 10-15 slide power point depicting propane. Students will develop a display exhibit of Propane. Development of a map of Kentucky's natural gas supply. End-of-unit exam.

SECTION 6: Support Materials (i.e., Resources, Technology, and Equipment)

A. Resources	NEED Secondary INFO book , USGA maps, enigma files
B. Technology	
C. Websites (samples of many available)	Department of Energy , www.doe.gov, Energy Information Administration, www.eia.gov,
D. Equipment	desktop computer with internet access